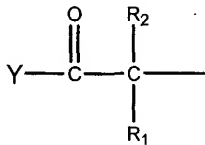


What Is Claimed Is:

1. A acrylonitrile block copolymer comprising $\text{—A—(B)}_m\text{—}$,
wherein A is represented by the following formula:



wherein

Y is a radical remaining after removal of the hydrogen atom of
a terminal hydroxy (OH) functional group of a polyester;

R₁ and R₂ represent alkyl, aryl, alkylaryl, aralkyl, aminoalkyl,
alkylamino, alkoxy, or alkoxy aryl groups;

B represents acrylonitrile or its methyl derivative monomer;

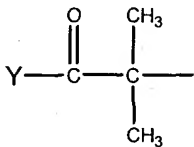
and

m is an integer from 20 to 10,000.

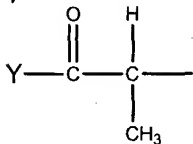
2. The acrylonitrile block copolymer as claimed in claim 1,
wherein the polyester radical Y is polycaprolactone,
polyvalerolactone, polybutyrolactone, polylactide or their copolymer
radical.

3. The acrylonitrile block copolymer as claimed in claim 1,
wherein B is methacrylonitrile monomer.

4. The acrylonitrile block copolymer as claimed in claim 1,
wherein A is



or



5. The acrylonitrile block copolymer as claimed in claim 1, wherein a number average molecular weight (Mn) of A is about $10^3 - 10^5$, and a number average molecular weight (Mn) of (B)_m is about $10^3 - 3 \times 10^5$.

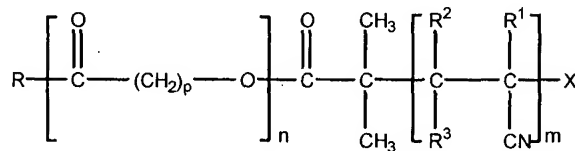
6. The acrylonitrile block copolymer as claimed in claim 1, wherein PDI of A is about 1.05 - 2.0.

7. The acrylonitrile block copolymer as claimed in claim 1, wherein PDI of A is about 1.05 - 1.5.

8. The acrylonitrile block copolymer as claimed in claim 1, wherein a number average molecular weight of the acrylonitrile block copolymer is about 1.05 - 2.0.

9. The acrylonitrile block copolymer as claimed in claim 1, wherein a number average molecular weight of the acrylonitrile block copolymer is about 1.05 - 1.5.

10. The acrylonitrile block copolymer as claimed in claim 1, wherein the acrylonitrile block copolymer is represented by the following formula:



wherein R¹, R² and R³ are the same or different and are H or CH₃;

R is any alkyl, aryl, alkoxy, or arylalkoxy group; p is an integer from 4 to 7; n is an integer from 20 to 2000.

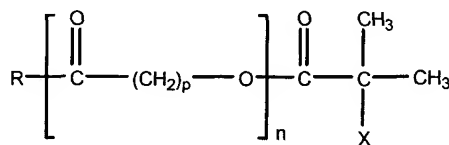
11. A cross-linking agent, surfactant, compatibilizer or dispersant comprising the acrylonitrile block copolymer as defined in claim 1.

12. A method for producing an acrylonitrile block copolymer, the acrylonitrile block copolymer comprising $\text{—A—(B)}_m\text{—}$, wherein $(\text{B})_m$ is a polyacrylonitrile block and A includes a polyester block and a linking group linking the polyester block and the polyacrylonitrile block, wherein B is an acrylonitrile or its derivative monomer, the method comprising:

halogenating a terminal group of a polyester to form a macroinitiator; and

contacting the macroinitiator with acrylonitrile or its derivative monomers by controlled radical polymerization.

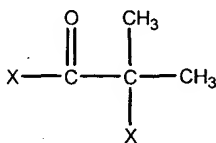
13. The method for producing the acrylonitrile block copolymer as claimed in claim 12, wherein the macroinitiator is



(I)

wherein R is benzyloxyl ($\text{C}_6\text{H}_5\text{CH}_2\text{O}$), or isopropoxy ((CH_3)₂CH)O; p is an integer from 4 to 7; n is an integer from 20 to 2000.

14. The method for producing the acrylonitrile block copolymer as claimed in claim 12, wherein the macroinitiator (I) is prepared by mixing the polyester and an organic compound, or a Lewis basic compound in a solvent, and is halogenated reacting with an organic halide represented by the following formula:

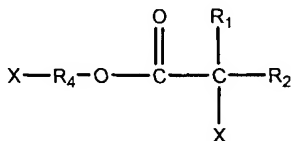


wherein, X is halogen and the two X are the same or different.

15. The method for producing the acrylonitrile block copolymer as claimed in claim 14, wherein the organic compound used to prepare the macroinitiator is triethylamine (NEt₃) or pyridine.

16. The method for producing the acrylonitrile block copolymer as claimed in claim 12, wherein the polyester block is polycaprolactone, polyvalerolactone, polybutyrolactone or polylactide block.

17. The method for producing the acrylonitrile block copolymer as claimed in claim 12, wherein the macroinitiator is prepared by mixing the polyester and an organic compound, or a Lewis basic compound in a solvent, and is halogenated with a halide represented by the following formula:



wherein X is halogen, the two X are the same or different, and

R₄ is alkyl, aryl, alkylaryl, aralkyl, aminoalkyl, alkylamino, alkoxy, or alkoxy aryl group.

18. The method for producing the acrylonitrile block copolymer as claimed in claim 12, wherein the controlled radical polymerization used to react the macroinitiator with the acrylonitrile or its derivative monomers is atom transfer radical polymerization (ATRP).

19. The method for producing the acrylonitrile block copolymer as claimed in claim 12, wherein the acrylonitrile monomer's derivative is methacrylonitrile.

20. The method for producing the polyacrylonitrile block copolymer as claimed in claim 12, wherein a number average molecular weight (Mn) of the polyacrylonitrile block is about 10³ - 3×10⁵.

1 21. The method for producing the polyacrylonitrile block
2 copolymer as claimed in claim 12, wherein the macroinitiator contacts
3 with acrylonitrile or its derivative monomers in the presence of a
4 mixture including a metal catalyst and a solvent.

1 22. The method for producing the polyacrylonitrile block
2 copolymer as claimed in claim 21, wherein the metal catalyst is consisted
3 of a metal compound MX_q and an organic ligand, M is a transition metal,
4 X is a halogen or pseudohalogen, q is the valence of the transition
5 metal.

1 23. The method for producing the polyacrylonitrile block
2 copolymer as claimed in claim 22, wherein M is Fe, Co, Ni, Cu, Rh,
3 Ir, Pd, Pt, Ru or Re.

1 24. The method for producing the polyacrylonitrile block
2 copolymer as claimed in claim 22, wherein the pseudohalogen is —NCS,
3 —NCO, —SCN, —CN, —N₃, —SO₄, carboxylate group, or —NO₂.

1 25. The method for producing the polyacrylonitrile block
2 copolymer as claimed in claim 22, wherein the organic ligand is
3 bipyridine, triphenylphosphine, 2-pyridyl diphenylphosphine or an
4 organic compound containing multiple nitrogen atoms, and a molar ratio
5 of organic ligand to metal is 1 - 4.

1 26. The method for producing the polyacrylonitrile block
2 copolymer as claimed in claim 25, wherein the organic compound
3 containing multiple nitrogen atoms is PMDETA
4 (pentamethyldiethylenetriamine).

1 27. The method for producing the polyacrylonitrile block
2 copolymer as claimed in claim 21, wherein the solvent is ethylene
3 carbonate, propylene carbonate, butylene carbonate, dimethyl
4 formamide (DMF) or hexafluoro isopropanol.